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ABSTRACT

This study evaluated the use of an online catalog by 33 children in the fourth, sixth, and eighth grades. As a basis of comparison, the children's ability to use the card catalog was also evaluated. Touch screen terminals were used to access a CLSI catalog. A specific set of tests was developed to determine if children have the necessary developmental skills to effectively locate and interpret bibliographic information as presented by both forms of library catalogs. The children studied did not have a broad knowledge of alphabetizing or filing conventions. They were moderately successful in using the card catalog (65% of the searches were successful), whereas only about 18% of the children were successful in the online searches. The students in the study preferred to use the card catalog over the online catalog. There were few differences between males and females. In general, fourth graders were the least skilled, eighth graders the most skilled, and sixth graders moderately skilled. It is recommended that software be designed that uses natural language, fewer screens, and clearer help messages. Library instruction needs to be more effective, and librarians need to be aware that children's skills are limited in using either type of catalog. Five references and a 12-item bibliography of library skills manuals are included. (Author/MES)

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1986 Carroll Preston Baber Award

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An Investigation of the Effectiveness of an Online Catalog in Providing Bibliographic Access to Children in a Public Library Setting

Research Report

March 1989

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1989
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An Investigation of the Effectiveness of an Online Catalog In Providing Bibliographic Access to Children in a Public Library Setting

ABSTRACT

The purpose of this study was to evaluate the use of an online catalog by children in fourth, sixth and eighth grades. To provide a basis of comparison, the study also evaluates the children's ability to use the card catalog. Touch screen terminals were used to access a CLSI catalog. A specific set of tests was developed to determine if children have the necessary developmental skills to effectively locate and interpret bibliographic information as presented by both forms of library catalogs.

The children studied did not have a broad knowledge of alphabetizing or filing conventions. The children were moderately successful in using the card catalog (65% of the searches were successful), whereas about 18% of the children were successful in the online searches. The students in the study preferred to use the card catalog over the online catalog. There were few differences between males and females, but in general, fourth graders were the least skilled, the eighth graders the most skilled and the sixth graders were moderately skilled.

It is recommended that software be designed that uses natural language, fewer screens and clearer "help" messages. Library instruction needs to be more effective, and the librarians providing reference service to children need to be aware that children's skills are limited in using either type of catalog.

INTRODUCTION

A 1982 nationwide survey of library users commissioned by the Council on Library Resources (1) concluded that there is widespread public acceptance of the online catalog. The research also conjectured that the key issue for librarians is not whether to adopt an online catalog, but how to proceed. The survey included public library users, but reached only a small number of users under the age of fourteen. A literature search indicates that no systematic study of online catalog use by children has ever been reported. To date, automation research has made only brief reference to this user group, and then the focus has been primarily on acceptance of technology, not the effectiveness of it. Librarians must evaluate the skill levels required by software design to be assured that children's access to materials is not hindered by the introduction of an online catalog. If public libraries are going to convert to the use of online catalogs for public access, it is important to look carefully at the use of such catalogs by children.

The need for evaluation of online catalogs goes beyond acceptance or comfort in the use of the computer. It may be assumed that younger library patrons are more accepting of computer technology because they learn to use computers in school. The more important question is whether children actually can use existing online programs to find needed materials. Of particular concern are developmental skills required by the interactive software. Can children understand information presented on the screens with a program now available? Are they generally capable of understanding search methods used in a program? Does the online catalog offer any advantages or disadvantages compared to the traditional card catalog? Answers to these questions will help program designers and librarians define the parameters of effective use of online catalogs by children and plan modifications in the online catalog, in bibliographic instruction, and reference/reader's advisory services.

This study evaluates children's use of an online catalog to gain bibliographic access to materials at the Downers Grove (Illinois) Public Library (DGPL). To provide a basis of comparison, the study also evaluates children's ability to use the DGPL card catalog. Although most libraries close their card catalogs when introducing an online catalog, the DGPL chose to maintain its card catalogs pending resolution of some specific problems connected with the online database. DGPL touch screen terminals were used to access a CLSI online catalog (OPAC terminal). A specific set of tests was developed to determine if children have the necessary developmental skills to effectively locate and interpret bibliographic information as presented by both forms of the catalog.

OVERVIEW

With the cooperation of Downers Grove Elementary School District #58, a sample of children in the fourth grade (nine-ten year olds), sixth grade (eleven-twelve year olds), and eighth grade (thirteen-fourteen year olds) was tested to see if their skill development would allow them to follow the online catalog protocols and interpret information presented on the screens in order to identify materials in the library's collection. In addition to observing student use of the library's online and card catalog, general skill level was measured by a written test. Texts pertaining to the design of instructional programs to teach media skills (2) suggest that 4th - 8th graders should have mastered alphabetizing skills as well as basic use of the card catalog. Therefore, it is reasonable to focus on basic alphabetizing skills and knowledge of simple filing rules as prerequisites to effective catalog use and as developmentally appropriate for the children in this study.

Three tests were developed to measure the children's skills, understanding of and preferences in the use of the card catalog and the touch screen online catalog. During a visit to the DGPL, children took part in the following activities:

1. Skills Test
   Skills included:
   A) Alphabetizing individual words, names, and phrases.
   B) Applying simple filing rules to locate titles, authors, and subjects; for example, knowing when to ignore articles and how to interpret spaces and punctuation.

2. Preference Survey: A survey was taken of the children's preferences between the card catalog and the online catalog.

3. Observation/Interview: Students, selected at random, demonstrated actual skills in manipulating the card or online catalog. The research observers noted:

   A) Ability to find call numbers for known items owned by the DGPL.

   B) Efficiency in finding bibliographic information in a known item search.

The research focused on collecting data to answer the following questions:

1. Do older elementary school children use a touch screen online catalog as effectively as a card catalog?

2. What are the impediments to effective catalog (online and card) use by children?

3. Which kind of catalog do children prefer to use? What aspects of the catalog (both online and card) do children identify as helpful or easy to use? What aspects of the catalog (online and card) do children identify as difficult to use or understand?

4. Are there changes in software design, bibliographic instruction or other public library practices that would make the online catalog easier for children to use?

5. Is independent (unassisted) bibliographic access improved or diminished for students if the library converts from the card catalog to the online catalog?

Children were considered effective or successful in using the catalog if 80% or more of the searches resulted in the identification of the call number. They were considered moderately successful if between 60% and 79% of the searches resulted in identification of the correct call number and they would be considered unsuccessful with a rate below 60%. Data were also collected to describe the techniques children employ when using a library catalog. The data on these techniques were used to get a sense of the efficiency of the children's searches. When children search a catalog in normal, non-experimental settings, their searches may be ultimately successful even if errors or mis-starts are made. However, the students' frustration or difficulty with searching may cause them to give up the search and choose other ways of accessing materials at the library.

METHODOLOGY

Prior to the study, the paper-and-pencil skills test and preference survey were developed by the researchers. The skills test was modeled on samples found in published library skills texts (see Bibliography). Consisting of seventeen questions, the skills test required alphabetizing skills and filing rule knowledge (see Appendix B). The preference test consisted of four questions and gave each student an opportunity to express reasons for his or her preference of catalog. Both the skills test and the preference survey were pretested with a class of fifth graders in a Downers Grove elementary school not participating in the study and then modified slightly.

The observation protocol was developed by informal observation of students using the catalogs at the DGPL. Observation worksheets were created, pretested with fifth graders at the DGPL, and modified to reflect student behavior and ease of use by the observers. Following the development of the skills test, preference survey and observation technique, Dr. Martin A. Siegel, Assistant Director of the Computer-Based Education Research Lab at the University of Illinois, acted as a reader for the data collection plan and offered a critical analysis of the instruments.

A great deal of care was taken in selecting the items students would search for during the study observations. A pool of fifteen search items was compiled consisting of five authors, five titles, and five subject headings (see Appendix C). Items were chosen that would be understandable to the students and that represented "clean" searches in both the card catalog and the OPAC. Titles of children's books were selected that contained easily understood words. The authors' names were distinct yet uncomplicated, i.e. neither "Smith" nor "Mikolaycak" was considered. The subject headings used were all either two or three word phrases that appeared a relatively few number of times in either catalog. Each chosen item was judged to be straightforward and to require only basic knowledge of filing rules to locate. Because the DGPL is part of a cluster of libraries using the same OPAC data base, each item was checked to ensure that the OPAC screens shown during the search contained no typographical errors. Five OPAC searches required a minimum of eight touches of the terminal screen for successful completion. Another five required nine touches, and the last five required at least ten or eleven. The fifteen search items were also checked against the card catalog to ensure that there were no irregularities or errors in filing or in the card format.

The children's services coordinator from the DGPL set up a schedule for the class visits during October and November, 1986. Classes of fourth, sixth, and eighth grade students were invited to the public library to participate in the research project. While the nature of the research activities was explained to the teachers of the participating students, the teachers did not direct their students to prepare for their library visit. A signed parent consent form was obtained for each student prior to the library visit (see Appendix A).

Staff from the DGPL and students from the University of Illinois' Graduate School of Library and Information Science were trained to administer the skills test and to record observational data consistently. Both the administration of the skills test and the observations were conducted with a high degree of consistency and without difficulties.

Classes visited the library one at a time. Upon arrival at the public library, students received a brief explanation of the activities planned for their visit. The class was randomly divided into two groups. The first group was given the preference survey and the paper-and-pencil skills test. While a half hour was allotted for completion of the skills test and survey, students were neither timed nor hurried. Students were able to finish this written work in the time provided.

The second group of students was segregated in a room adjacent to the children's services area. Students in this second group were randomly selected to conduct searches at either the card catalog or the online catalog. Before beginning a search, students who were chosen to do an OPAC search were shown a sample entry in the online catalog format. The students who were to be observed at the card catalog were shown a sample card entry for the identical title. The observers asked students to identify the author, title, and call number for the sample entry (see Appendix C).

Next, students were given a card with a title, author, or subject heading printed on it and were instructed to find in the catalog either the specific title, any book by the listed author, or any book on the specific subject. Each of the students selected for observation was given the opportunity to do a title, an author, and a subject search, but all three searches had to be conducted with the same catalog. The order of the search cards alternated between author, titles and subject searches. Students could decline to do more than one search. In the case of the online searches, the observer excused students after the first or second search if students were unable to experiment with the OPAC or when the number of touches to the OPAC screen indicated that improvement or success was not likely. For searches on either catalog, students were asked to find the call number when the search item was located. If the student said the call number aloud or pointed to it, the search was considered a success.

Halfway through the class visit, the activities of the two groups were switched. In this way, all students visiting the library completed the skills test and survey, while the majority of students were observed using either the card catalog or the online catalog.

SAMPLE

Students

Teachers of fourth, sixth, and eighth grade students from four elementary schools and one junior high school (grade 7-8) in Downers Grove agreed to participate in the project. Because Downers Grove is a relatively homogeneous suburban community, it was assumed that all classes that participated would be representative of the community. As shown in Table 1, each grade was represented by more than 50 participants and the sample was divided roughly into thirds by grade. The fourth grade was the largest population (39%) and the eighth grade was the smallest (29.9%). The sample was fairly evenly divided by gender (Table 2). There were slightly more females in the fourth and eighth grades as well as in the total sample (Table 3).

As indicated in Table 4, the students in the sample reported being regular users of the DGPL. This relatively high use (68.2 % use the library once or more a month) is similar to community survey results obtained by the DGPL in previous years. Fourth graders are the least active users of the library and sixth and eighth graders are almost equal in their level of use. Gender is not a factor in reported library use (Table 5). When questioned about use of the OPAC terminals (Table 6) and the card catalog (Table 8), the fourth graders reported being considerably less familiar with library catalogs than did the older students. The sixth and eighth graders were fairly familiar with the OPAC terminal and very familiar with the card catalog. Only 30% of the fourth graders had used the OPAC, though fourth graders reported familiarity with the card catalog more often (64%). More males (62%) than females (49.53%) had used the OPAC previously (Table 7), but males and females had used the card catalog almost equally (Table 9).

The students in the study had received instruction in library skills as part of a district-wide library instruction program. Instruction in alphabetizing is begun in second grade, fourth graders are introduced to the card catalog, and in sixth grade basic filing rules are introduced. By eighth grade students should be able to alphabetize to the third letter. (See Appendix A for the statement of library instruction of participating students.)

Table 1
Student Participants
by Grade

Grade 4	81 39.13%
Grade 6	64 30.92%
Grade 8	62 29.95%
Total	207 100.00%

N=207

Table 2
Student Participants
by Gender

Male	99 47.83%
Female	108 52.17%
Total	207 100.00%

N=207

Table 3
Student Participants
by Grade and Gender

Gender	Grade			Total
	4	6	8	
Male	38 46.91%	35 54.69%	26 41.94%	99 47.83%
Female	43 53.09%	29 45.31%	36 58.06%	108 52.17%
Total	81 100.00%	64 100.00%	62 100.00%	207 100.00%

N=207

Table 4
Frequency of Library Visits
by Grade

	Grade			Total
	4	6	8	
More than once a month	35 43.21%	36 56.25%	32 51.62%	103 49.76%
Once a month	7 8.64%	16 25.00%	15 24.19%	38 18.36%
Less than once a month	23 28.40%	8 12.50%	13 20.97%	44 21.26%
Never	16 19.75%	4 6.25%	2 3.23%	22 10.63%
Total	81 100.00%	64 100.00%	62 100.00%	207 100.00%

Table 5
Frequency of Library Visits
by Gender

	Gender		Total
	Male	Female	
More than once a month	48 48.48%	55 50.93%	103 49.76%
Once a month	22 22.22%	16 14.81%	38 18.36%
Less than once a month	19 19.20%	25 23.15%	44 21.26%
Never	10 10.10%	12 11.11%	22 10.63%
Total	99 100.00%	108 100.00%	207 100.00%

Table 6
Previous Use of the OPAC Terminal
by Grade

	Grade			Total
	4	6	8	
Yes	24 30.00%	48 75.00%	42 67.74%	114 55.34%
No	56 70.00%	16 25.00%	20 32.26%	92 44.66%
Total	80 100.00%	64 100.00%	62 100.00%	206 100.00%

Table 7
Previous Use of the OPAC Terminal
by Gender

	Gender		Total
	Male	Female	
Yes	61 61.62%	53 49.53%	114 55.34%
No	38 38.38%	54 50.47%	92 44.66%
Total	99 100.00%	107 100.00%	206 100.00%

Table 8
Previous Use of the Card Catalog
by Grade

	Grade			Total
	4	6	8	
Yes	52 64.20%	58 90.63%	56 90.32%	166 80.19%
No	29 35.80%	6 9.38%	6 9.68%	41 19.81%
Total	81 100.00%	64 100.00%	62 100.00%	207 100.00%

Table 9
Previous Use of the Card Catalog
by Gender

	Gender		Total
	Male	Female	
Yes	81 81.82%	85 78.70%	166 80.19%
No	18 18.18%	23 21.30%	41 19.81%
Total	99 100.00%	108 100.00%	207 100.00%

DATA ANALYSIS

Collected data were coded and analyzed at the Library Research Center at the University of Illinois using descriptive statistics. The results of the data analyses follow. Information about the sample is presented first, followed by information on the preference survey and skills test. Finally, the results of the observations are discussed. Data are reported by both grade and gender.

Preference Survey

Children perceived that the card catalog was easier to use, perhaps because they are more familiar with it. Ease of use was the predominant reason for stating preferences. The majority of children in all grades and of both genders preferred using the card catalog over the OPAC terminal. Slightly under 17% indicated that they had no preference (Table 10, 11). The sixth graders were more positive about the OPAC, choosing it 27% of the time. Lack of familiarity with, or lack of ability to use the OPAC was often given as the reason for using the card catalog, implying that the card catalog was preferred by default. In their written comments, students expressed some negative attitudes about computers in general. Others liked OPAC because they liked computers. While most students were able to express an opinion about catalog preference, it would be imprudent to assume strong allegiance to either format since comments seem more dependent on familiarity rather than passion.

Table 10
Preference by Type of Catalog
by Grade

	Grade			Total
	4	6	8	
OPAC Terminal	9 11.11%	17 26.56%	7 11.29%	33 15.94%
Card catalog	60 74.07%	38 59.38%	42 67.74%	140 67.63%
No preference	12 14.81%	9 14.06%	13 20.97%	34 16.43%
Total	81 100.00%	64 100.00%	62 100.00%	207 100.00%

Table 11
Preference by Type of Catalog
by Gender

	Gender		Total
	Male	Female	
OPAC Terminal	18 18.18%	15 13.89%	33 15.94%
Card catalog	68 68.69%	72 66.67%	140 67.63%
No preference	13 13.13%	21 19.44%	34 16.43%
Total	99 100.00%	108 100.00%	207 100.00%

SKILLS TEST

The skills test was developed to measure the students' understanding of and competence at alphabetizing and using simple filing rules. The structure of the various questions was chosen to represent a standard approach to teaching alphabetizing and filing rules to upper elementary and junior high school students. The range of alphabetizing skills measured by the skills test was from single letter alphabetizing (Questions #1 and #2) to alphabetizing by full word (questions #3 - 5 and #14) and also included word phrases (questions #6 - 13 and #15 - 17). In the word phrases category, titles, authors, author/title combinations and subject headings were presented, testing knowledge of common filing rules as well as alphabetization. The purpose of the skills test was to assess student knowledge and to determine how library skills commonly taught in school correlate to actual performance at both the online and the card catalog. Data are reported for overall performance, alphabetizing, and filing conventions.

The skills test had a total of 115 points (see Appendix B for grading procedure). Scoring ranges are skilled (80-100%), moderately skilled (79-60%) and unskilled (below 60%). These scoring levels are used throughout the data analysis. The range of students' scores was 32% to 92%, 11.59% of the students were skilled, 62.8% of the students were moderately skilled and 25.6% of the students tested in the unskilled range (Table 12). Eighth graders were the most skilled and the fourth grade

Table 12
Total Test Score
by Grade

	Grade			Total
	4	6	8	
Skilled (95-115)	5 6.17%	6 9.38%	13 20.97%	24 11.59%
Moderately Skilled (75-95)	35 43.21%	47 73.44%	48 77.42%	130 62.80%
Unskilled	41 50.62%	11 17.19%	1 1.61%	53 25.60%
Total	81 100.00%	64 100.00%	62 100.00%	207 100.00%

had the fewest skilled students. More than half of the fourth graders were unskilled, while only 1.61% of the eighth grade students were ranked as unskilled. Males and females had a similar pattern of test scores with the fewest students in the skilled category, and the most students ranked in the moderately skilled range (Table 13).

ALPHABETIZATION

In questions #1 and #2, students were asked to alphabetize lists of individual letters. In Question #1, students were asked to write the letter that preceded the letter given, and in Question #2, they were asked to supply the letter that followed the letter given. Ninety-nine percent of all the students were successful at these tasks (Tables 14, 15, 16, 17). Students were asked to alphabetize words which could be differentiated by the first letter (Question # 3, Table 18, 19) and then words which could be differentiated by the first two letters (Question #4, Table 20, 21). Again, a majority of students were ranked as skilled at these tasks. Over 80% of all students were skilled at alphabetizing to the second letter. Males and females had similar skills in these tasks.

When students were asked to alphabetize to the third letter (Question #5, Table 22, 23), however, there was a marked decrease in the skill demonstrated. The percentage of students ranked as skilled was 58.94%, with slightly more than half of the fourth and sixth grade students rated as

Table 13
Total Test Score
by Gender

	Gender		Total
	Male	Female	
Skilled	11 11.11%	13 12.04%	24 11.59%
Moderately skilled	59 59.60%	71 65.74%	130 62.80%
Unskilled	29 29.29%	24 22.22%	53 25.60%
Total	99 100.00%	108 100.00%	207 100.00%

Range = 0-115 pts
Range of scores: 32% - 92%

Tables 14 & 15
Question #1: Write the letter that comes before each of these letters in the alphabet: z / c / q / o / j / r / m / i / v / e / x.

Table 14
Alphabetization, Single Letter
by Grade

	Grade			Total
	4	6	8	
Skilled (8-10)	79 97.53%	64 100.00%	62 100.00%	205 99.03%
Moderate Skill (6-7)	1 1.23%			1 .48%
Total	1 1.23%			1 .48%

Range = 0-10 points

Table 15
Alphabetization, Single Letter
by Gender

	Gender		Total
	Male	Female	
Skilled (8-10)	97 97.98%	108 100.00%	205 99.03%
Moderate Skill (6-7)	1 1.01%		1 .48%
Unskilled (0-5)	1 1.01%		1 .48%

Range = 0-10 points

Tables 16 & 17
Question #2: Write the letter that comes after each of these letters of the alphabet: a/f/w/p/h/s/u/k/d/n/l.

Table 16
Alphabetization, Single Letter
by Grade

	Grade			Total
	4	6	8	
Skilled (8-10)	79 97.53%	64 100.00%	62 100.00%	205 99.03%
Moderate Skill (7-6)	1 1.23%			1 .48%
Unskilled	1 1.23%			1 .48%

Range = 0-10 pts.

Table 17
Alphabetization, Single Letter
by Gender

	Gender		Total
	Male	Female	
Skilled (8-10)	98 98.99%	107 99.07%	205 99.03%
Moderate Skill (6-7)	1 1.01%		1 .48%
Unskilled (0-5)		1 .93%	1 .48%

Range = 0-10 pts.

Tables 18 & 19
Question #3: Number these words in alphabetical order: cat/dog/apple/used/wear/vine/tear/quiet/open/pour/robin.

Table 18
Alphabetization, Words by First Letter by Grade

	Grade			Total
	4	6	8	
Skilled (7-8)	67 82.72%	63 98.44%	59 95.16%	189 91.30%
Moderate Skill (5-6)	5 6.17%		3 4.84%	8 3.86%
Unskilled (0-4)	9 11.11%	1 1.56%		10 4.83%

Range = 0-8 pts.

Table 19
Alphabetization, Words by First Letter by Gender

	Gender		Total
	Male	Female	
Skilled (7-8)	92 92.93%	97 89.81%	189 91.30%
Moderate Skill (5-6)	3 3.03%	5 4.63%	8 3.86%
Unskilled (0-4)	4 4.04%	6 5.56%	10 4.83%

Range = 0 - 8 pts.

Tables 20 & 21
Question #4: Number these words in alphabetical order: dove/ dwelling/dear/dyed/dry/during/date/diet.

Table 20
Alphabetization, Words by Two Letters by Grade

	Grade			Total
	4	6	8	
Skilled (7-8)	67 82.72%	62 96.88%	55 88.71%	184 88.89%
Moderate Skill (5-6)	10 12.35%		3 4.84%	13 6.28%
Unskilled (0-4)	4 4.94%	2 3.13%	4 6.45%	10 4.83%

Range = 0-8 pts.

Table 21
Alphabetization, Words by Two Letters by Gender

	Gender		Total
	Male	Female	
Skilled (7-8)	86 86.87%	98 90.74%	184 88.89%
Moderate Skills (5-6)	6 6.06%	7 6.48%	13 6.28%
Unskilled (0-4)	7 7.07%	3 2.78%	10 4.83%

Range = 0-8 pts.

Tables 22 & 23
Question #5: Number these words in alphabetical order: poster/ porcupine/power/poultry/possess/porcelain/powder/positive.

Table 22
Alphabetization, Words by Third Letter by Grade

	Grade			Total
	4	6	8	
Skilled (7-8)	42 51.85%	35 54.69%	45 72.58%	122 58.94%
Moderate Skill (5-6)	9 11.11%	18 28.13%	13 20.97%	40 19.32%
Unskilled (0-4)	30 37.04%	11 17.19%	4 6.45%	45 21.74%

Range = 0-8 pts.

Table 23
Alphabetization, Words by Third Letter by Gender

	Gender		Total
	Male	Female	
Skilled (7-8)	59 59.60%	63 58.33%	122 58.94%
Moderate Skill (5-6)	18 18.18%	22 20.37%	40 19.32%
Unskilled (0-4)	22 22.22%	23 21.30%	45 21.74%

Range = 0-8 pts.

skilled. About a third of the fourth graders' scores were at the unskilled level at this task. Similarly, on Question #14, where students were asked to alphabetize four single-word subject headings, slightly more than half the students were skilled (Table 24, 25). Fourth graders were the least often skilled and eighth graders the most often skilled. Males and females exhibited the same pattern of achievement on these questions.

FILING RULES

All students had low performance levels in alphabetizing whole titles. In Question #10, in which knowledge of a variety of filing rules was required, slightly fewer than half the students scored in the skilled range (Tables 26, 27). In Questions #8 and #9, where familiarity with filing rules was also essential ("St. for Saint" and "initial article" rules), under 10% of the students were skilled (Tables 28, 29, 30, 31). Students seemed to have particular trouble with the list of eleven "monster" titles in Question #11 (Tables 32, 33). For this task, 95.65% of the students were unskilled. Eighth graders scored better on these title order questions, but never more than 50% of the eighth graders scored in the skilled category on any one title order question. Males and females scored in a similar fashion on these questions.

Students were somewhat more skilled in putting authors' names in order. On Question #13, eighth graders were in the skilled category over 80% of the time, while fourth graders were skilled only 48.15% of the time (Tables 34, 35). When students were asked to put pairs of author names in alphabetical order, only 44.44% were skilled (Question #12, Tables 36, 37). Females were somewhat more successful at these tasks than males. On the three questions involving alphabetizing authors and titles, there was a range of performance. Students did the least well at putting pairs of items in order (Question #6, Tables 38, 39). Eighth graders were skilled 74.19% of the time on the four items presented in Question #15, but were skilled only 16.13% of the time in Question #16, which presented a similar list of titles and authors. Fourth and sixth graders were more skilled on Question #15 also, but were unskilled 80% of the time on Question #16 (Tables 40, 42). Females scored better on question #15, but males were more skilled than females on Question #16 (Tables 41, 43). An explanation for the low score on Question #16 was that students needed to understand the filing convention of filing word by word and incorrectly alphabetized "Freeman, Dr." before *Free To Be You and Me*.

Tables 24 & 25
Question #14: Number these subjects in alphabetical order as they appear in our card catalog: Carpentry/Carnivals/Castles/ Cartoons.

Table 24
Alphabetization
by Grade

	Grade			Total
	4	6	8	
Skilled (4)	35 43.21%	36 56.25%	45 72.58%	116 56.04%
Unskilled (0-2)	46 56.79%	28 43.75%	17 27.42%	91 43.96%

Range = 0-4 pts.

Table 25
Alphabetization
by Gender

	Gender		Total
	Male	Female	
Skilled (4)	54 54.55%	62 57.41%	116 56.04%
Unskilled (0-2)	45 45.45%	46 42.59%	91 43.96%

Range = 0-4 pts.

Tables 26 & 27
Question #10: Number these titles in alphabetical order as they appear in our card catalog. Is There Life on a Plastic Planet? / Dr. Doom: Superstar / Deathwatch / Look-it-up-Book of Stars and Planets / Look! Look!

Table 26
Titles - Alphabetical Order
by Grade

	Grade			Total
	4	6	8	
Skilled (4-5)	38 46.91%	27 42.19%	34 55.74%	99 48.06%
Moderate Skill (3)	18 22.22%	24 37.50%	25 40.98%	67 32.52%
Unskilled (0-2)	25 30.86%	13 20.31%	2 3.28%	40 19.42%

Range = 0-5 pts.

Table 27
Titles - Alphabetical Order
by Gender (Question #10)

	Gender		Total
	Male	Female	
Skilled (4-5)	46 46.46%	53 49.53%	99 48.06%
Moderate Skills (3)	29 29.29%	38 35.51%	67 32.52%
Unskilled (0-2)	24 24.24%	16 14.95%	40 19.42%

Range = 0-5 pts.

Tables 28 & 29
Question #8: Number these titles in alphabetical order as they appear in our card catalog: Saints for All Seasons/St. Patrick's Day/The Saints/Saint Jerome.

Table 28
"SAINT" Titles, Alphabetical Order by Grade (Question #8)

	Grade			Total
	4	6	8	
Skilled (4)	3 3.70%	4 6.25%	11 18.03%	18 8.74%
Unskilled (0-2)	78 96.30%	60 93.75%	50 81.97%	188 91.26%

Range = 0-4 pts.

Table 29
"Saint" Titles, Alphabetical Order by Gender

	Gender		Total
	Male	Female	
Skilled (4)	9 9.09%	9 8.41%	18 8.74%
Unskilled (0-2)	90 90.91%	98 91.59%	188 91.26%

Range = 0-4 pts.

Tables 30 & 31
Question #9: Number these titles in alphabetical order as they appear in our card catalog: Ah-Choo/The ABC's/A Horse Called September/A is for Angry/The Horse and His Boy.

Table 30
"A" Titles, Alphabetical Order
by Grade

	Grade			Total
	4	6	8	
Skilled (4-5)	1 1.23%	2 3.13%	5 8.20%	8 3.88%
Moderate Skill (3)	16 19.75%	21 32.81%	14 22.95%	51 24.76%
Unskilled (0-2)	64 79.01%	41 64.06%	42 68.85%	147 71.36%

Range = 0-4 pts.

Table 31
"A" Titles, Alphabetical Order
by Gender

	Gender		Total
	Male	Female	
Skilled (4-5)	4 4.04%	4 3.74%	8 3.88%
Moderate Skills (3)	27 27.27%	24 22.43%	51 24.76%
Unskilled (0-2)	68 68.69%	79 73.83%	147 71.36%

Range = 0-4 pts.

Tables 32 & 33
Question #11: Number these titles in alphabetical order as they appear in our card catalog: Monster is Coming/Monster in the Third Dresser Drawer/Monster Manners/Monster Mania/Monsters, Mysteries, and UFO's/Monster Trucks and Other Giant Machines on Wheels/Monster Birthday Party/Monster and the Tailor/Monsters from the Movies/Mountains Around the World/Monster's Nose was Cold.

Table 32
"Monster" Titles, Alphabetical Order by Grade

	Grade			Total
	4	6	8	
Skilled (9-11)	1 1.23%		2 3.23%	3 1.45%
Moderate Skill (7-8)	2 2.47%	1 1.56%	3 4.84%	6 2.90%
Unskilled (0-6)	78 96.30%	63 98.44%	57 91.94%	198 95.65%

Range = 0-11 pts.

Table 33
"MONSTER" Titles, Alphabetical order by Gender

	Gender		Total
	Male	Female	
Skilled (9-11)	1 1.01%	2 1.85%	3 1.45%
Moderate Skills (7-8)	4 4.04%	2 1.85%	6 2.90%
Unskilled (0-6)	94 94.95%	104 96.30%	198 95.65%

Range = 0-11 pts.

Tables 34 & 35
Question #13: Number these names in alphabetical order as they appear in our card catalog: Foster, Stephanie/Fortune, J.J./Ford, Ford Madox/Foster, Sally.

Table 34
Authors, Alphabetical Order
by Grade

	Grade			Total
	4	6	8	
Skilled (4)	39 48.15%	39 60.94%	52 83.87%	130 62.80%
Unskilled (0-2)	42 51.85%	25 39.06%	10 16.13%	77 37.20%

Range = 0-4 pts.

Table 35
Authors, Alphabetical Order
by Gender

	Gender		Total
	Male	Female	
Skilled (4)	55 55.56%	75 69.44%	130 62.80%
Unskilled (0-4)	44 44.44%	33 30.56%	77 37.20%

Range = 0-4 pts.

Students were unskilled more than 80% of the time when asked to put multiple-word subject headings in order. Sixth graders were the best at this task and fourth graders the least proficient (Tables 44, 45). In Question #7, students were asked to match titles and authors to the correct "drawers" in the card catalog. Eighth graders were skilled 75.81% of the time, while fourth graders were skilled only 25.93% of the time (Tables 46, 47). Males and females performed in a similar pattern.

SUMMARY

In general, sixth and eighth graders demonstrated moderate knowledge of alphabetizing and filing rules, but more than 50% of the fourth graders were unskilled. Performance on the skills test generally followed the same pattern whereby the fourth graders achieved the lowest scores, eighth graders the best and the sixth graders in between. There was very little difference in performance by gender. All students did well on the simple alphabetizing, but had difficulty with questions that required knowledge of specific filing rules or multiple-word phrase alphabetizing. On the basis of the skills test, it could be predicted that students would have difficulty using either the card catalog or the OPAC. It could also be expected that the fourth graders would be the least successful, while the eighth graders would have the best success rate.

Tables 36 & 37
Alphabetizing Authors, Question #12

Does "Fleischman, P.R. come before or after "Fleischman, Charles" in our card catalog?

Does "Flesh, Y." come before or after "Fleischman, Charles" in our card catalog?

Does "Fletcher, Jessica" come before or after "Fletcher, A. Sarah" in our card catalog?

Table 36
Ordering Author Pairs
by Grade

	Grade			Total
	4	6	8	
Skilled (5-6)	29 35.80%	26 40.63%	37 59.68%	92 44.44%
Moderate Skill (3-4)	20 24.69%	25 39.06%	21 33.87%	66 31.88%
Unskilled (0-2)	32 39.51%	13 20.31%	4 6.45%	49 23.67%

Range = 0-6 pts.

Table 37
Ordering Author Pairs
by Gender

	Gender		Total
	Male	Female	
Skilled (5-6)	36 36.36%	56 51.85%	92 44.44%
Moderate Skills (3-4)	34 34.34%	32 29.63%	66 31.88%
Unskilled (0-2)	29 29.29%	20 18.52%	49 23.67%

Range = 0-6 pts.

Tables 38 & 39
Ordering Author/Title Pairs, Question #6

Does Little Pear come before or after "Little, Jean" in our card catalog?

Does The Bell Witch come before or after "Bellairs, John" in our card catalog?

Does Wildlife on the Watch come before or after "Wilde, Oscar" in our card catalog?

Table 38
Ordering Author/Title Pairs
by Grade

	Grade			Total
	4	6	8	
Skilled (5-6)	23 28.40%	15 23.44%	17 27.42%	55 26.57%
Moderate Skill (3-4)	40 49.38%	39 60.94%	37 59.68%	116 56.04%
Unskilled (0-2)	18 22.22%	10 15.63%	8 12.90%	36 17.39%

Range = 0-6 pts.

Table 39
Ordering Author/Title Pairs
by Gender

	Gender		Total
	Male	Female	
Skilled (5-6)	23 23.23%	32 29.63%	55 26.57%
Moderate Skills (3-4)	57 57.58%	59 54.63%	116 56.04%
Unskilled (0-2)	19 19.19%	17 15.74%	36 17.39%

Range = 0-6 pts.

Tables 40 & 41
Question #15: Number these authors and titles in alphabetical order as they appear in our card catalog: Frankenstein/Frankel, Max/Frank and Mary/Fradin, Dennis.

Table 40
Similar Author/Titles in Alphabetical Order by Grade

	Grade			Total
	4	6	8	
Skilled (4)	28 34.57%	35 54.69%	46 74.19%	109 52.66%
Unskilled (0-2)	53 65.43%	29 45.31%	16 25.81%	98 47.34%

Range = 0-4 pts.

Table 41
Similar Author/Titles in Alphabetical Order by Gender

	Gender		Total
	Male	Female	
Skilled (4)	42 42.42%	67 62.04%	109 52.66%
Unskilled (0-2)	57 57.58%	41 37.96%	98 47.34%

Range = 0-4 pts.

Tables 42 & 43
Question #16: Number these authors and titles in alphabetical order as they appear in our card catalog: Amos Fortune, Freeman/Freeman, Don/Free to be You and Me/Fortune, Amos.

Table 42
Mixed Author/Titles in Alphabetical Order by Grade

	Grade			Total
	4	6	8	
Skilled (4)	7 8.64%	12 18.75%	10 16.13%	29 14.01%
Unskilled (0-2)	74 91.36%	52 81.25%	52 83.87%	178 85.99%

Range = 0-4 pts.

Table 43
Mixed Author/Titles in Alphabetical Order by Gender

	Gender		Total
	Male	Female	
Skilled (4)	20 20.20%	9 8.33%	29 14.01%
Unskilled (0-2)	79 79.80%	99 91.67%	178 85.99%

Range = 0-4 pts.

Tables 44 & 45
Question #17: Number these subjects in alphabetical order as they appear in our card catalog: Foods — Manufacturing/ Friends, Society of/Food — Social customs/Friendship — Ethics.

Table 44
Similar Subjects in Alphabetical Order by Grade

	Grade			Total
	4	6	8	
Skilled (4)	11 13.58%	18 28.13%	12 19.35%	41 19.81%
Unskilled (0-2)	70 86.42%	46 71.88%	50 80.65%	166 80.19%

Range = 0-4 pts.

Table 45
Similar Subjects in Alphabetical Order by Gender

	Gender		Total
	Male	Female	
Skilled (4)	23 23.23%	18 16.67%	41 19.81%
Unskilled (0-2)	76 76.77%	90 83.33%	166 80.19%

Range = 0-4 pts.

1. A-B	4. Db-Do	7. Hep-Jan	10. M-Mac
2. C-Ch	5. Dp-Goh	8. Jao-La	11. Mb-Mi
3. Ci-Da	6. Goi-Heo	9. Le-Lz	12. Mj-Mz

Tables 46 & 47
Question #7: Pretend these are labels on the card catalog. Write down the drawer number where you would look for each author or title: Moominland Winter/Is That You Miss Blue/He's My Brother/Candles, Cakes, & Donkey Tails/Einstein Anderson, Science Sleuth/McGowen, Tom/Fradin, Dennis/Hest, Amy/Dewey, Ariane/Hepzibah/Mr. Popper's Penguins/Dr. Doolittle/Goffstein, Brooke/Gravity is a Mystery

Table 46
Drawer Match
by Grade

	Grade			Total
	4	6	8	
Skilled (12-14)	21 25.93%	28 43.75%	47 75.81%	96 46.38%
Moderate Skill (9-11)	21 25.93%	24 37.50%	14 22.58%	59 28.50%
Unskilled (0-8)	39 48.15%	12 18.75%	1 1.61%	52 25.12%

Range = 0-14 pts.

Table 47
Drawer Match
by Gender

	Gender		Total
	Male	Female	
Skilled (12-14)	42 42.42%	54 50.00%	96 46.38%
Moderate Skills (9-11)	29 29.29%	30 27.78%	59 28.50%
Unskilled (0-8)	28 28.28%	24 22.22%	52 25.12%

Range = 0-14 pts.

Observation

Findings are presented for the identification of the elements of a catalog entry, for card catalog searches, and for online searches.

SAMPLE ENTRY IDENTIFICATION

Students performing card catalog searches were shown a copy of a catalog card entry and asked to identify the author, title and call number. All students did well at identifying the author (Tables 48, 49). Eighth grade students were also skilled at identifying the title and the call number. Sixth graders were skilled at identifying the call number, but were only able to identify the title 57.5% of the time. Less than half the fourth graders correctly identified the title, and indicated the call number slightly more than half the time. Females and males had similar success patterns on this identification exercise.

Students doing online searches were also asked to identify a sample catalog entry. In addition to identifying author, title and call number, these students were asked if the item was owned by the DGPL. Over 80% of the sixth and eighth graders identified the author, while about two thirds of the fourth graders could successfully complete this identification (Table 50). Eighth graders also performed well at identifying title and call number. Sixth graders identified the title about half the time, and were moderately successful at identifying the call number slightly more than half the time.

The students had the most difficulty in identifying whether the item was owned by the DGPL. The eighth graders were the most skilled and fourth graders the least skilled at this task. Females and males performed in a similar fashion when identifying parts of the online catalog entry (Table 51).

Table 48
Entry Identification — Card Catalog
by Grade

	Grade			Total
	4	6	8	
Author				
(correct)	27	38	42	107
	90.00%	95.00%	100.00%	95.54%
(wrong)	3	2		5
	10.00%	5.00%		4.46%
Title				
(correct)	13	23	37	73
	43.33%	57.50%	88.10%	65.18%
(wrong)	17	17	5	39
	56.67%	42.50%	11.90%	34.82%
Call Number				
(correct)	16	34	40	90
	53.33%	91.89%	95.24%	82.57%
(wrong)	14	3	2	19
	46.67%	8.11%	4.76%	17.43%

Table 49
Entry Identification — Card Catalog
by Gender

	Gender		Total
	Male	Female	
Author			
(correct)	50	57	107
	94.34%	96.61%	95.54%
(wrong)	3	2	5
	5.66%	3.39%	4.46%
Title			
(correct)	34	39	73
	64.15%	66.10%	65.18%
(wrong)	19	20	39
	35.85%	33.90%	34.82%
Call Number			
(correct)	43	47	90
	84.31%	81.03%	82.57%
(wrong)	8	11	19
	15.69%	18.97%	17.43%

Table 50
Entry Identification — Online Catalog
by Grade

	Grade			Total
	4	6	8	
Author				
(correct)	23	31	22	76
	67.65%	88.57%	84.62%	80.00%
(wrong)	11	4	4	19
	32.35%	11.43%	15.38%	20.00%
Title				
(correct)	20	19	19	58
	58.82%	54.29%	70.37%	60.42%
(wrong)	14	16	8	38
	41.18%	45.71%	29.63%	39.58%
Call Number				
(correct)	19	27	22	68
	55.88%	77.14%	81.48%	70.83%
(wrong)	15	8	5	28
	44.12%	22.86%	18.52%	29.17%
DGPL owns				
(correct)	10	14	16	40
	29.41%	41.18%	64.00%	43.01%
(wrong)	24	20	9	53
	70.59%	58.82%	36.00%	56.99%

CARD CATALOG SEARCHES

Observations of searches sought to measure the students' success rate as well as effectiveness. "Success" was defined as locating the correct entry and indicating the call number. An "effective" search was defined as using the alphabetical guides within drawers. Four necessary steps in conducting card catalog searches were isolated. First, students needed to select the correct bank of drawers, since the DGPL has a divided catalog with author and titles together and subjects filed separately. Observers were asked to note whether students went to the correct catalog section immediately, if they went to the incorrect section but then corrected their error, or if the student never searched in the correct section. The fourth graders had the most errors and eighth graders had the least (Table 52). Females were somewhat better at locating the correct section, but females and males had the same pattern in their performance (Table 53).

The second task for students searching the card catalog was to select the correct drawer. Observers were asked to note if students selected the correct drawer immediately, selected incorrectly but corrected the mistake, or did not search in the correct drawer. Finding the correct drawer in the catalog was somewhat more difficult than finding the correct section. More than half of the sixth and eighth graders picked the correct drawers immediately, but 35.22% of the sixth graders and 22.95% of the eighth graders had to correct mistakes in drawer selection (Table 54). Only 21.74% of the fourth graders were successful on their first attempt to find the correct drawer, and slightly more than half of the fourth graders made mistakes and then corrected their error. Females and males had the same pattern of performance on this task (Table 55).

The next step in the catalog search was locating the correct card. Observers noted search strategies in four categories: effective (immediate) uses of file guides within the drawers, occasional use of the guides, card-by-card searching, or random searching within the drawer. It was possible for students to use a combination of these strategies, at times flipping through card-by-card, searching randomly, and using the guides all in the course of one search. Few students used the random approach to finding the correct card (Table 56, 57). Effective card searches were performed by approximately one-third of the fourth graders, slightly more than half of the sixth graders and slightly more than two-thirds of the eighth graders. About one-third of the fourth graders used the card-by-card search technique and about one-third used the guides occasionally. Approximately 13% of the sixth and eighth graders used the card-by-card method. About 28% of the sixth graders used the guides occasionally. Eighth graders used the guides occasionally approximately 17% of the time. Females and males showed the same search pattern in this step.

Table 51
Entry Identification — Online Catalog
by Gender

	Gender		Total
	Male	Female	
Author (correct)	35 79.55%	41 80.39%	76 80.00%
(wrong)	9 20.45%	10 19.61%	19 20.00%
Title (correct)	25 56.82%	33 63.46%	58 60.42%
(wrong)	19 43.18%	19 36.54%	38 39.58%
Call Number (correct)	28 63.64%	40 76.92%	68 70.83%
(wrong)	16 36.36%	12 23.08%	28 29.17%
DGPL owns (correct)	17 38.64%	23 46.94%	40 43.01%
(wrong)	27 61.36%	26 53.06%	53 56.99%

Table 52
Observation: Section Selection — Card Catalog
by Grade

	Grade			Total
	4	6	8	
Immediate	50 62.50%	100 85.47%	115 91.27%	265 82.04%
Wrong side	19 23.75%	12 10.26%	6 4.76%	37 11.46%
Unable	11 13.75%	5 4.27%	5 3.97%	21 6.50%
Total	80 100.00%	117 100.00%	126 100.00%	323 100.00%

Table 53
Observation: Section Selection — Card Catalog by Gender

	Gender		Total
	Male	Female	
Immediate	121 78.57%	144 85.21%	265 82.04%
Wrong side	20 12.99%	17 10.06%	37 11.46%
Unable	13 8.44%	8 4.73%	21 6.50%
Total	154 100.00%	169 100.00%	323 100.00%

The last step in the card catalog search was to either say the call number aloud or to indicate the call number to the observer when asked. In the case of author and subject searches, any call number by the given author or on the subject was accepted by the observer. The correct call number was given by 79.84% of the eighth graders, 70.94% of the sixth graders and 33.33% of the fourth graders (Table 58). Females and males were very similar in their success rate in the card searches (Table 59).

ONLINE SEARCHES

There were three discrete steps to the online search. Success again was defined as finding the correct entry and indicating the DGPL call number. The measure of effectiveness was the number of touches to the OPAC screen per search.

First, students had to select the correct file for their search. The screen offered the choice of title, author, or subject files. As with the card catalog searches, observers were asked to note if students selected the correct file immediately, whether the students selected the wrong file and corrected the error, or if students were unable to select the correct file. More than 80% of the students selected the correct file immediately (Tables 60, 61). Few students made mistakes and then corrected them. About 30% of the fourth graders searched in the incorrect file, a 7% higher rate of incorrect selection than those fourth graders observed at the card catalog. Less than 10% of the 6th and 8th graders doing online searches searched in an incorrect file. Females and males had the same pattern of behavior in selecting the correct files for their searches.

The second step in the online search was for students to make the correct alphabetical choice by touching the item that immediately preceded alphabetically the item they were searching for. Each touch of the screen narrowed the scope of the alphabetical list within the file. The percentage of students who found their search items was 51.72% for the eighth graders, 44.4% of the sixth graders, and only 4% of the fourth graders (Table 62). Females and males had very similar success rates (Table 63).

The third step of the online search was for the students to say the call number aloud or to indicate the call number on the screen when asked. None of the fourth graders correctly identified the call number; 16.7% of the sixth graders and 13.3% of the eighth graders were successful in identifying it (Table 64). Females and males performed in a similar way (Table 65).

Table 54
Observation: Drawer Selection — Card Catalog by Grade

	Grade			Total
	4	6	8	
Immediate	15 21.74%	60 57.14%	85 69.67%	160 54.05%
Corrected mistake	36 52.17%	37 35.24%	28 22.95%	101 34.12%
Unable	18 26.09%	8 7.62%	9 7.38%	35 11.82%
Total	69 100.00%	105 100.00%	122 100.00%	296 100.00%

Table 55
Observation: Drawer Selection — Card Catalog by Gender

	Gender		Total
	Male	Female	
Immediate	68 48.23%	92 59.35%	160 54.05%
Corrected mistake	53 37.59%	48 30.97%	101 34.12%
Unable	20 14.18%	15 9.68%	35 11.82%
Total	141 100.00%	155 100.00%	296 100.00%

Table 56
Locates Correct Card — Card Catalog
by Grade

	Grade			Total
	4	6	8	
Effective use	18 31.03%	53 54.64%	64 68.09%	135 54.22%
Occasional use	19 32.76%	28 28.87%	16 17.02%	63 25.30%
Card by Card	19 32.76%	13 13.40%	13 13.83%	45 18.07%
Random	2 3.45%	3 3.09%	1 1.06%	6 2.41%
Total	58 100.00%	97 100.00%	94 100.00%	249 100.00%

Table 57
Locates Correct Card — Card Catalog
by Gender

	Gender		Total
	Male	Female	
Effective use	56 49.60%	79 58.09%	135 54.22%
Occasional use	35 31.00%	28 20.59%	63 25.30%
Card by Card	20 18.00%	25 18.38%	45 18.07%
Random	2 1.40%	4 2.94%	6 2.41%
Total	113 100.00%	136 100.00%	249 100.00%

Table 58
Call Number Identification — Card Catalog
by Grade

	Grade			Total
	4	6	8	
Correct call number	27 33.33%	83 70.94%	103 79.84%	213 65.14%
No call number given	54 66.67%	34 29.06%	26 20.16%	114 34.86%
Total	81 100.00%	117 100.00%	129 100.00%	327 100.00%

Table 59
Call Number Identification — Card Catalog
by Gender

	Gender		Total
	Male	Female	
Correct call number	101 65.16%	112 65.12%	213 65.14%
No call number given	54 34.84%	60 34.88%	114 34.86%
Total	155 100.00%	172 100.00%	327 100.00%

Table 60
Data File Identification — Online Catalog
by Grade

	Grade			Total
	4	6	8	
Immediate	44 66.67%	70 89.74%	57 95.00%	171 83.82%
Corrected mistake	2 3.03%	1 1.28%		3 1.47%
Unable	20 30.30%	7 8.97%	3 5.00%	30 14.71%
Total	66 100.00%	78 100.00%	60 100.00%	204 100.00%

Missing = 2

Table 61
Data File Identification — Online Catalog
by Gender

	Gender		Total
	Male	Female	
Immediate	76 80.85%	95 86.36%	171 83.82%
Corrected mistake	2 2.13%	1 .91%	3 1.47%
Unable	16 17.02%	14 12.73%	30 14.71%
Total	94 100.00%	110 100.00%	204 100.00%

Missing = 2

The efficiency of the online searches was measured by counting the number of touches to the OPAC screen. All of the searches required a minimum of eight to eleven touches to complete, if accomplished efficiently without extraneous touches or errors. Normal searches, allowing for careless errors, would range from 8 to 22 touches. Searches of under eight touches would not be successful and would indicate that the search stopped before reaching the screen which displayed the call number for the item of interest. Searches with more than twenty-two touches would indicate that the searcher started over several times or began to scroll item-by-item as part of the search. The range of screen touches was from 0 to 99+.

The fourth graders carried out searches with the fewest touches: 40% of their searches had too few touches, about 50% had searches with the normal number of touches and only 12% did searches with too many touches to be efficient. Sixth graders had searches with too few touches about 20% of the time and, like the fourth graders, were in the normal range of searching about 50% of the time. The remaining third of the sixth graders had too many touches during their searches. Only 5% of the eighth graders showed too few touches and slightly over 50% of their searches fell into the normal range while about 40% of their searches had more than 22 touches. Eighth graders persevered and conducted the longest searches and rarely gave up with only a few touches. The fourth graders had the shortest searches and often gave up early. All three grades produced about half the searches in the normal range of touches (Table 66). Females had somewhat longer searches than males, but both males and females had similar patterns of performance (Table 67).

SUMMARY

In the card catalog observations, most students understood how to read the sample entry citation, though fourth graders were much less skilled in locating the search item and the call number than the older students. Using the OPAC for searches, students were moderately skilled at reading the online sample citation, though they had difficulty ascertaining if DGPL owned the item. When students were asked to complete full searches, that is identify the call number, the success rate dropped. On the card catalog searches, sixth and eighth graders were successful more than two-thirds of the time, but the fourth graders were only successful a third of the time. Overall, the students were the least successful in completing full online searches. None of the fourth graders were successful, while the older students were only successful about 25% of the time. (Table 64).

Table 62
Reaches General Entry — Online Catalog
by Grade

	Grade			Total
	4	6	8	
Yes	2 3.03%	28 35.90%	30 48.39%	60 29.13%
No	64 96.97%	50 64.10%	32 51.61%	146 70.87%
Total	66 100.00%	78 100.00%	62 100.00%	206 100.00%

Table 63
Reaches General Entry — Online Catalog
by Gender

	Gender		Total
	Male	Female	
Yes	28 29.47%	32 28.83%	60 29.13%
No	67 70.53%	79 71.17%	146 70.87%
Total	95 100.00%	111 100.00%	206 100.00%

Table 64
Successfully Identifies Call Number — Online Catalog by Grade

	Grade			Total
	4	6	8	
Correct		20 25.64%	17 27.42%	37 17.96%
Wrong	66 100.00%	58 74.36%	45 72.58%	169 82.04%
Number of attempts	66 100.00%	78 100.00%	62 100.00%	206 100.00%

Table 65
Successfully Identifies Call Number — Online Catalog by Gender

	Gender		Total
	Male	Female	
Correct call number	14 14.74%	23 20.72%	37 17.96%
Wrong	81 85.26%	88 79.28%	169 82.04%
Number of attempts	95 100.00%	111 100.00%	206 100.00%

Table 66
Number of Touches in Search Attempt — Online Catalog by Grade

	Grade			Total
	4	6	8	
Too few touches (0-7)	24 40%	18 22%	3 5%	45 22%
Normal range (8-22)	29 48%	38 47%	33 54%	100 50%
Too many (23-99+)	7 65 12%	25 99+ 31%	25 99+ 41%	57 28%
Total	60 100.00%	81 100.00%	61 100.00%	202 100.00%

Table 67
Number of Touches in Search Attempt — Online Catalog by Gender

	Gender		Total
	Male	Female	
Too few (0-7)	23 24%	22 20%	45 22%
Normal range (8-22)	46 50%	54 50%	100 50%
Too many (23-99+)	24 26%	33 30%	57 28%
Total	93 100.00%	109 100.00%	202 100.00%

As well as gathering data on success rate, data were collected on the effectiveness of both the card and online searches. Based on the number of touches online or use of card guides in the card catalog, sixth and eighth graders were moderately effective and fourth graders were ineffective. Students made fewer mistakes and corrected mistakes more often when working with the card catalog than they did when using the online catalog. Females and males had the same patterns of performance during the observations.

Limitations of the Study

1. This study was designed to be preliminary and descriptive in nature. Since no other observational studies of children's use of catalogs could be found, there are no normative data to use as a basis for comparison. While the methodology was developed based on other observational studies and the instruments were field tested, further use and refinements need to be made before either the methodology or tests are viewed as reliable or valid.

2. This study was conducted on one aspect of bibliographic access. To fully determine how children access information or how they use libraries to meet their informational needs, it would be necessary to study how children form search questions, what search strategies they use to find library materials, how they locate the physical item needed, and how they use materials once they are located. This study attempted to focus on how children use library catalogs, since they are, or were thought to be, the most direct method of providing bibliographic access to children.

3. Care should be taken in making generalizations based on the conclusions of this report because only one online system in one library was studied. Replication of the study is necessary before generalizations can be made concerning children's use of library catalogs in any setting served by any catalog.

4. One group of 207 students participated in this study. A statement from the school district regarding their library skills program is appended (Appendix A). District 58 employed half-time library resource teachers in the four grade schools and a full-time junior high librarian at the time of the study. There was no control over the library skills program nor any objective way to measure it.

ANALYSIS OF RESULTS

Data collected for this study was designed to answer five research questions. Results were also analyzed for performance variations between grades as well as between males and females. Findings related to each of these questions will be discussed in this section.

Research Questions

1. Do older elementary school children use a touch screen online catalog as effectively as a card catalog?

Based on the data collected, children do not use the online catalog as effectively as a card catalog. About 65% of the children were successful in the card catalog searches, whereas about 10% of the children were successful in the online searches. While children made errors in each step of both types of searches, the children using the card catalog made fewer errors than those using the online catalog.

2. What are the impediments to effective catalog (online and card) use by children?

There seem to be several impediments to use of library catalogs by children. First, some of the students studied lacked many of the basic skills necessary to use catalogs of either type easily. These students were generally unsuccessful at alphabetizing full words and were similarly unable to demonstrate mastery of common filing conventions. They also exhibited some problems identifying titles, authors, and call numbers correctly. A second impediment involved the use of both the card catalog and the online catalog. Because there is a series of steps involved in using either catalog, children were presented not with one problem to solve, but a sequence of problems. The sequential nature of successful searching appeared to be difficult for younger children (ages 8-12) to master due to their age and thus, stage of development. Sequential searching was also problematic for older students. There were simply too many opportunities for error in the process of using a catalog, between file selection, choosing the correct catalog drawer or narrowing down the online alphabetical lists, and locating the search item.

A third hindrance to effective catalog use was the students' inability to conceptualize what letters or words fall "between" entries. This was demonstrated in the scores on Question 7 of the skills test, which replicated card catalog drawers. In trying to identify the correct drawer in which various authors and titles were filed, less than half the students scored within the skilled range and fully one-quarter were unskilled.

Their difficulty in visualizing made the task of searching for entries online particularly hard, since searching depended so heavily on the concept of selecting the item that came directly before the search item in each of the OPAC alphabetical lists.

A fourth difficulty was the fact that students could not follow the online protocols to conclude their searches and identify the DGPL call numbers. Of the 35.09% who reached the general entry for their search item online (Table 45), only 10.3% were actually able to name the call number. (See OPAC screen sequences in Appendix C.)

3. Which kind of catalog do children prefer to use? What aspects of the catalog (both online and card) do children identify as helpful or easy to use? What aspects of the catalog (online and card) do children identify as difficult to use or understand?

The students in this study preferred to use the card catalog (68%) over the online catalog (16%). Another 16% had no preference. Familiarity seemed to be the only common reason that children gave for their preference. The students were not particularly articulate in explaining their choices ("it is easy," "because I like it"). It seems likely that children preferred the card catalog because they had used one in their school library. The online catalog may not have been preferred simply because students were unfamiliar with it. If students had had equal experience with both catalogs, the preferences might have been more balanced.

4. Are there changes in software design, bibliographic instruction or other public library practices that would make the online catalog easier for children to use?

Several things could be done to improve children's use of both types of catalogs. First, no matter which catalog is to be used, children should have more effective and directed instruction. The public library will need to cooperate with the schools to devise ways to reinforce instruction for children in basic alphabetizing skills and filing rules. Particularly if the card catalog is to be used, this instruction would seem to be the best way to improve student performance, since changes in the design of the card catalog are impractical. The public library staff needs to commit to tutoring students in the use of the catalog as part of reference or readers' advisory service. The library might choose to provide a written instruction sheet for students to help them use the catalog. Such instructions could break down the series of problem-solving steps to ensure success at each level.

For use of the online catalog, instruction is also necessary, but schools may have trouble implementing bibliographic instruction if they do not

use the same online system. A public library might assist in preparing an instructional unit on the online system for use in the schools. The benefit of class visits must be examined carefully because of the expense and low likelihood of success. Individual instruction to young patrons and simple written instructions for the use of the online catalog could also be undertaken by the public library.

While changing the design of the online catalog can be difficult, it is both technically possible and feasible. Online catalogs are an emerging technology and as such, the design of the software will continue to evolve. For children, a better design could eliminate some of the problem-solving steps.

There need to be fewer screens per search and fewer items on each screen (a smaller percentage of the screen used). The bibliographic entry should be shortened and made easier to read. The DGPL online screens were too cryptic for students to interpret, even when the entry elements were clearly identified. Children would be aided by the use of natural, concise language and clearly written messages. User errors should be tagged so children know when an error has been made, and so that errors can be easily corrected without returning to the first screen. The great promise of the online catalog is that it can be redesigned, whereas the card catalog cannot.

5. Is independent (unassisted) bibliographic access improved or diminished for students if the library moves from the card catalog to the online catalog?

If the library does not provide personal assistance to students using the online catalog, student bibliographic access is greatly reduced by the introduction of an online catalog. However, it needs to be stressed that fourth grade students did not appear to have mastery of the card catalog either. For younger students, the choice of catalog would not really affect their access, since they would require assistance using either catalog.

Grade Level Differences

There appears to be a developmental aspect to both the skills students possess and how they perform catalog searches. In general, the fourth graders were the least skilled, the sixth graders more skilled than the fourth graders, and the eighth graders the most skilled. This is true for both the skills test as well as in the card catalog observations. The sixth graders, however, performed better than the eighth graders in the online observation. The sixth and eighth graders showed similarities in their performance, while the fourth graders were much less skilled than the

older students. All students seemed to understand the tasks they were asked to do and did their best to cooperate, so this difference could be attributed to developmental skills that are acquired at an older age.

Gender Differences

Females and males performed in a similar manner on both the test and in the observations. Males had used the OPAC more than the females, but did not perform better because of this previous use. Data indicated that gender was not a factor in catalog use or knowledge of alphabetization and filing rules.

CONCLUSIONS

The results of this study raise several important issues. These issues need to be explored both as explanation of the data and as a basis for decision-making in the public library setting. The discussion will include the relationship of developmental theory to children's use of the catalog, the implications of children's skills and performance on the choice of type of catalog provided in a public library, issues in interface design and lastly, implications for service to children, including instruction in a public library.

Developmental Issues

The pattern of performance on both the skills test and in the observation of subjects followed the anticipated developmental model. That is, the younger children did less well on almost every measure. Overall, the fourth graders differed dramatically in their performance, while the sixth and eighth graders were more similar. This would also be expected since the fourth graders would be operating in Piaget's concrete operations stage and the sixth and eighth graders would be moving into the formal operations stage of development. One would expect that students at the concrete stage of reasoning would rely on trial-and-error problem solving, using such techniques as card-by-card comparisons or looking inside each drawer to see what part of the alphabet is inside. Fourth graders used these techniques to a greater extent. At the concrete operations stage, children need to depend on manipulation of physical items. While they can understand comparisons between items and changes in items (conservation and reversibility), it is difficult for the child at the concrete stage to use rules, to generalize, or to apply logic to problem solving.

It is not surprising therefore that the fourth graders need to actually look at each card or check drawers as a way of using the card catalog. Nor is it unexpected that the OPAC is almost unintelligible to the fourth graders. It is doubtful that the younger children have any way of understanding the size of the database, and the format of the screens does not help children "see" what decisions need to be made. While the OPAC allows the patron to page item-by-item, it is difficult to tell how many items are between the item presented and the item desired. Since the patron can see how many drawers the card catalog has and how many inches of cards are in each drawer, the card catalog provides this information at a glance. Thus, the patron can adapt his search with this information.

While the fourth graders' mastery of either library catalog could be improved with instruction and practice, they will naturally need to use a less efficient approach that allows them to manipulate cards or helps them see online entries as separate physical items.

The transition to formalized thinking begins at age eleven or twelve. This is the final developmental stage that continues through adulthood. Formal thinking is characterized by the ability to use logic, apply rules and to use conditional (if/then) thinking. These skills are needed for catalog use. The student no longer is dependent on what he sees or senses for what he knows. The formal operations thinker can "visualize" the alphabet and select where to start looking for an entry without having to see physical cards or compare actual entries. The sixth and eighth graders would both be at the beginning of the formal stage and thus have some mastery of how to apply rules and use conditional logic. It would be expected that the older students would be capable of "figuring out" how to use the catalog given the rules for catalog use. Since the older students only had knowledge of the rudimentary rules of catalog use, they may not have had enough knowledge to be successful. Also, students at the beginning of this stage are still learning applications for logic, so they are not always able to apply the correct rules or interpret rules correctly.

Another level of concern in the use of library catalogs is the experience, training and sophistication of the user. To use the catalog, the patron must be able to remember and apply the correct rule or rules, perform several steps (apply several rules) in sequence and utilize rules accurately and precisely. A basic concept or rule that needs to be mastered is that of order. Essentially, the catalog user has to understand the concept of alphabetization and be able to locate words and phrases that fall between two points in an alphabetic sequence. To do this, the user has to be able to identify what items come before or after a fixed point in the alphabet. The library catalog in either form presents an extraordinarily complex set of rules of order to master. While we might think of the task as "knowing the alphabet," it is apparent that the task is closer to a working knowledge of AACRII.

The catalog user, thus, has two challenges. He must know the rules and also understand the logic or the organizational structure on which the rules are based. If the user understands the structure, but doesn't know the rules, he may be able to figure out how to do a search, but this would not be particularly efficient. If the user knows the rules (or many of the rules), but not the structure, any exceptions to known rules will present insoluble problems and it will be difficult to keep all the rules straight.

For example, if the user has the sense that the catalog is supposed to group words alphabetically, it would be logical to look for "Dr." as if the word were spelled out (that is under "doctor" rather than "dr."). If the user did not know the specific rule for this instance and tried "Dr." first, it would be reasonable to try "doctor." If the user knows only the rules, not the reason for the rules, it would be difficult to adapt one's search strategy. If one forgot this rule of abbreviation, one would not have a good second guess.

The children in this study did not have knowledge of many rules, nor did they seem to be able to understand the concepts well. Naive users of any age will need to increase knowledge, practice sequencing and concentrate on accurate task performance. The students in the study did not demonstrate understanding of the concepts involved in alphabetizing. Moreover, they did not know many rules and were unable to accurately perform the several steps included in catalog use without making errors. The older students were better able to correct errors and were more knowledgeable than the younger students, though few of the students really demonstrated sophistication in catalog use.

Use of the catalog is dependent on developmental level, experience and training. Because catalog use can be complex, it is important to recognize that children who are not yet developmentally capable of mastering the necessary logic for the catalog may require simpler library catalogs. Another alternative may be providing children with assistance in the use of the existing "adult" catalog. Thus, our findings suggest that in order to improve children's use of library catalogs, the catalog needs to be simplified (the total number of rules reduced). In addition, better training and guidance must be furnished to these young library patrons.

Choice of Catalog

The Downers Grove Public Library was in a unique position to study the use of the two catalogs, since an online catalog and an up-to-date card catalog are both available for patron use. From the date of installation of OPACs in 1983, the DGPL staff was aware of the problems related to the multi-agency, cooperative database of which the library is a part. Dupli-

cate entries, incorrect or incomplete entries and difficulties in searching for locally-owned titles caused the staff to delay any efforts to abandon the card catalog. The online catalog is favored by some patrons for its record of shelf status and ability to scan the holdings of over fifty other libraries in the database. To date, however, the OPAC is not sufficiently user friendly and reliable to serve as the library's only catalog. It is important to note that the problems with the online catalog's database were intentionally factored out of this research so as not to influence students' success rates.

When making the decision to automate the library's catalog, children's bibliographic access must be carefuly considered. This study suggests that while the technology has been developed to automate catalogs, librarians should not assume that young patrons will be able to successfully use an online system. Although the structure of the CLSI touch screen catalog was designed to be user friendly, the system cannot compensate for the developmental and educational level of young patrons.

The students in the sample had received prior instruction and were at various stages of expertise necessary for using a card catalog. Older children had both more instruction and more time to practice and apply what they had learned than younger students. While the students demonstrated some mastery, they were not really ready to use the catalog unassisted. Being able to alphabetize by the first, second or third letter is useful, but unless one is able to alphabetize by full words and phrases, using a library catalog will be laborious and frustrating. To be of much practical use, students need to master additional skills, since even complete mastery of rudimentary skills will not be enough to ensure success in catalog use.

The test of skills, as well as the selection of the sample search items, simplified the task of a student finding necessary information. Students were not asked to accomplish complex searches. Given that students did not demonstrate mastery of the simple and moderately difficult rules and searches, this choice seems to have been a reasonable one. But one needs to be mindful that if students enter the library to find materials, their "real" searches will not necessarily be as straightforward as the ones presented to them in this project. Logically, one would expect students to have a lower success rate when they are performing more complicated searches. For example, students were not asked to demonstrate knowledge about how numbers are treated in a title or about catalog conventions for eras in U.S. history. And yet, students might need information on the Civil War or need to locate 1984 by George Orwell. It is appropriate to view skill attained by subjects in this project as the upper limit of performance. It is unlikely that these students would perform better on the wider variety of searches that represent their real information needs.

In comparing rates of successful searches between the card catalog and the OPAC, sixth graders were four times more likely to be successful and eighth graders were six times as likely to be successful using the card catalog. No fourth grader used the OPAC successfully. The card catalog offered all students the best opportunity for locating items. The online catalog imposes too many barriers to successful searching to make it a reasonable choice for use by Downers Grove youth. Until an online catalog is enhanced for greater compatibility with student abilities and developmental levels, the DGPL Children's Services card catalog will be maintained. Of the two OPAC terminals in the children's services department, one has been removed since this study was completed.

It was also concluded that since the OPACs would continue in operation in two other adult public service departments in the library, an effort would be made to introduce students in grades six through eight to the online catalog. Under their guidance and instruction, the children's services staff will encourage these older students to experiment with the OPAC. Since the only convenient access for the adult literature collection is through the OPAC, it is important that transition in catalog use be provided to upper elementary and junior high students.

Interface Design

To improve children's use of library catalogs, we might choose to improve instruction, restructure library service to children or improve the design of the catalog. Instructional plans and changes in reference and reader's advisory procedures can be adapted equally well for both the card catalog and the OPAC. The OPAC, however, is much more receptive to design changes than the card catalog. Although the subjects were more skilled at using the card catalog than the OPAC, it is not reasonable to conclude that librarians should never choose OPAC for use by children in public libraries. As design changes are made, OPAC will become the catalog of choice. It is reasonable to conclude that library service and OPAC design need to be improved to meet the information needs of youth in our high technology society.

There are three areas where interface design could be changed to improve bibliographic access to children. Initially, the sequences or steps presented should be reduced and simplified. Children have as many as twelve screens to manipulate and five different screen designs to interpret. Since the card catalog offers four basic steps (file selection, drawer selection, card selection and card interpretation), the OPAC should be designed to parallel more closely this simpler model.

Secondly, the individual screen designs need improvement. Since children have some difficulty searching alphabetically, it would be helpful to

reduce the number of choices offered at one time. The OPAC screens offer eleven terms to read and thus, eleven choices to make. This can be overwhelming. A series of natural language questions such as "Does your search come alphabetically between hat and hot?", would be easier for children.

Children had trouble understanding the entry screen. It contained too much information and too high a percentage of print on the screen. The lines should be spaced farther apart with larger print and less information. It may be feasible to present the patron with a simple, bibliographic entry and allow access to the complete shelf list entry as a second screen, rather than compel the unsophisticated patron to sort through a full citation. The other screen design needing improvement is the help screen. Help messages should be tailored to each kind of error that can be made. Thus, the assistance provided is targeted to the particular error only. Generic help screens ask the patron to read through extra information to determine what steps are necessary to proceed.

The third area of concern in interface design is that instruction and/or coaching can be provided online. Front end instruction can be designed to lead patrons through a variety of search possibilities. If the patron is a knowledgeable user, this instruction can be bypassed, or if the user finds he needs help in the middle of his search, he can move to a diagnostic mode (are you sure of the spelling of your search terms?, what other related terms could be used? etc.) or a coaching lesson. The great strength of computers is that they may be used in different ways by each user, but this capability is not evident in this OPAC system.

Service Decisions at the Downers Grove Public Library

As a result of this Baber research project, a balance was struck in the children's services department in providing assistance at the catalogs. Staff assistance in use of both the card catalog and the OPAC has been strengthened to improve student access to library materials.

When working with students in grades six through eight, the DGPL staff introduces them to the OPAC rather than using the card catalog for author and title searches. The inherent problems within the library's particular database would render subject searches incomplete and inefficient. By utilizing the OPAC and describing the search strategy in an informal, narrative style, students can receive the training and practice necessary for successful OPAC searches. A model for an effective OPAC demonstration still needs to be developed, tested, revised, and implemented as a result of the information gained by this study.

Although the DGPL has made this commitment to instruction, it is still the patron's choice whether he or she will use the OPAC, the card catalog, or rely on library staff assistance. Additionally, factors such as length of patron visit, an individual's interest in learning, and/or the complexity of the search will influence whether an OPAC search or demonstration would be proposed. Nevertheless, the DGPL message should be clear: the children's services staff wants to be helpful and instructive to those who want to learn more about the online catalog.

The new approach of individual instruction to be undertaken at the DGPL may appear "hit or miss." But given the commitment to the online catalog and student acculturation to its use, this method was viewed as the most productive process. Further work with the local schools may lead to more effective and cooperative teaching methods, such as videotaped library instruction or instructional software.

Instruction presents a unique set of difficulties in the broader perspective of schools and a public library's online catalog. In many cases, a school library will not have an OPAC and rarely will it have an online system compatible with the public library. Moreover, the school media program of bibliographic instruction does not easily lead to effective use of a public library's catalog. Teaching a separate set of skills in the public library to groups of students would probably be ineffective. Even if students were transported to the public library for class visits, the extent of instruction and the opportunity for student practice with the OPACs would be limited. The expense of supplying online terminals to local schools would also be prohibitive. Therefore, it is essential that school and public librarians work together to bridge the gap in technologies and existing instructional programs to aid children in becoming effective catalog users.

DGPL service to students using the card catalog was also adjusted as a result of this study. The DGPL staff often viewed students' independent card catalog searches with the illusion of competence. That is, students would give the appearance of mastery, even to the point of declining an offer of staff assistance. Staff serving children now are even more proactive in helping students at the card catalog. There is no assumption that card catalog skills are readily applied by students using the public library catalog, even when the skills have been carefully taught in schools.

The children's inability to easily visualize the alphabetical contents of the catalog drawers led to the re-labelling of the card catalog drawers in the DGPL children's services department. When the contents of the card catalog were shifted, a conscious attempt was made to shorten the drawer labels to one- or two-letter combinations, changing from labels that had read precisely "ABA - ACZ" to this simpler "AB - AC."

After analyzing the school district's library skills curriculum and the skill level of the students in the study, suggestions were formulated to strengthen the existing curriculum. From the testing, it was concluded that students were able to alphabetize to the third letter, had acquired basic skills in using the card catalog, and could identify the elements of the sample entries. Yet mastery of these skills still did not ensure successful card catalog use. To improve student success in catalog searching, it was recommended that the school librarians develop means of emphasizing the concept of identifying entries that fall between two alphabetical points and to reinforce students' ability to make numerous before/after decisions when alphabetizing. Developmentally, this should start at the 5th-6th grade level and would replace concentration on letter-by-letter alphabetizing.

Bibliographic instruction needs to be adapted to match the stages of a child's development. Younger children should concentrate on learning the fundamentals of classification, that is, the Dewey Decimal System and the related library vocabulary. Even after they are taught card catalog use, fourth graders appear to be developmentally unready for skilled searching or the application of filing rules. Expectations in bibliographic instruction for the intermediate grades need to reflect the productive building of related skills rather than actual mastery of card catalog searching. An analogy is the practice of scales before learning how to play the piano.

The findings of the Baber Research Project present librarians with the opportunity to consider children's accessibility to a library's bibliographic records and the difficulties they encounter. These initial efforts to isolate and quantify the steps taken by users of library catalogs need to be replicated in other settings. For software designers and online catalog vendors, the information gained may provide a framework for future improvements. Based on this research data, there can now be a heightened sensitivity and awareness of the multiple problems experienced by children attempting to locate materials using library catalogs.

NOTES

1. Joseph Matthews, Gary Lawrence, Douglas Ferguson, eds.. Using Online Catalogs: A Nationwide Survey. New York: Neal Schuman Publishers, 1983.

2. Examples of texts are:

   Irene Wood Bell and Jeanne E. Wieckert. Basic Media Skills Through Games. Littleton, CO: Libraries Unlimited, 1979.

   H. Thomas Walker and Paula Kay Montgomery. Teaching Library Media Skills, 2nd ed. Littleton, CO: Libraries Unlimited, 1983.

   Lillian Biermann Wehmeyer. The School Librarian as Educator. 2nd ed.. Littleton, CO: Libraries Unlimited, 1984.

3. Richerd Lerner. Concepts and Theories of Human Development. Reading, Ma.: Addison-Wesley, 1976. p. 175.

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Hyland, Anne M. School Library Media Skills Test. Littleton, CO: Libraries Unlimited, 1986.

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LaCoste, Roberta. Library Skills #2784. Oak Lawn, IL: Ideal School Supply, 1969.

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Zlotnick, Barbara Bradley. Ready for Reference. Littleton, CO: Libraries Unlimited, 1984.

APPENDIX A

Parent Permission Form

Statement of Library Instruction

DOWNERS GROVE PUBLIC LIBRARY
1050 Curtiss Street
Downers Grove, Illinois 60515
Telephone: 312-960-1200

Kathleen Mehaffey Balcom
Library Director

Dear Parent:

During the last week of October and the first week of November, classes from District 58 will be visiting the Downers Grove Public Library to participate in a research project to study students' use of the card catalog and the online catalog.

Your child's class has been selected to participate in the project. Students will be taking a paper and pencil test to measure their skills at alphabetizing. At random, students will be selected to use the card catalog or the online catalog to search for book information. No prior use of the catalogs or the Downers Grove Public Library is necessary to participate. Students will also be given a tour of the library as part of the 1-1/2 hour program.

This project is funded by a grant from the American Library Association. The grant was awarded to me and to Dr. Leslie Edmonds, a professor at the University of Illinois Graduate School of Library and Information Science. Over the past months, the research project has been reviewed by the University of Illinois, the District 58 School Board Administration, and the Downers Grove Public Library Board of Trustees.

I am asking your cooperation in returning the parent consent form to your child's teacher by Friday, October 24. Thank you for your help. If have any questions about the project, please call me.

Sincerely,
Paula Moore
Paula Moore
Children's Services Coordinator

- -

PARENT CONSENT FORM - BABER RESEARCH PROJECT SCHOOL VISIT

As the parent or guardian of _____,
a minor of_____years of age, I give my permission for the above named child to visit the Downers Grove Public Library in order to participate in the research project being conducted by the public library on the effectiveness of the online and card catalogs.

I understand that no risk is involved in the research and that I may withdraw my child from participation at any time. The confidentiality of student answers is assured.

_____
Parent or Guardian Signature

_____
Date

PLEASE HAVE YOUR CHILD RETURN THIS TO CLASS BY FRIDAY, OCTOBER 24, 1986

BEST COPY AVAILABLE

Downers Grove Grade School District 58

Longfellow - Instructional Materials Center
1435 Prairie Avenue Downers Grove, Illinois 60515 (312) 968-5454

STATEMENT OF LIBRARY INSTRUCTION OF PARTICIPATING STUDENTS

ELEMENTARY SCHOOL DISTRICT 58, DOWNERS GROVE, ILLINOIS

Classes from four District 58 K-6 grade schools and one junior high school participated in the Baber Research Project. At the time of the project, the District employed half-time learning resource teachers in the grade schools and a full-time librarian at the junior high school. In the grade schools, the learning resource teachers are mainly responsible for the library instruction while classroom teachers and librarians handle the curriculum at the junior high level.

Instruction in alphabetizing is emphasized in second grade and reinforced at the third grade level, where students are expected to be able to alphabetize by the first letter.

A full library skills curriculum is provided for students in each grade. The area of study that relates to this project for fourth graders is an entire unit on the card catalog that emphasizes the parts of catalog cards and the type of cards. Abbreviations as applied to card catalog use are taught at this level also.

By the 6th grade, students have been instructed in more advanced use of the card catalog such as use of the catalog drawer labels to locate materials efficiently. Filing rules such as disregarding first articles when they appear in book titles and "nothing before something" in filing cards are also taught to students.

Skills taught in the grade schools are reinforced in the eighth grade. Students should be able to alphabetize to the third letter. Other filing conventions that are taught include the rules that numbers and abbreviations are filed as spelled out in catalog.

Lee Anne Applegate

LEE ANNE APPLEGATE
Coordinator of Library Services
District 58

APPENDIX B

Skills Test

Skills Test Grading Procedure

ALPHABETIZING AND PREFERENCE SURVEY

Baber Research Project
Downers Grove Public Library

NAME _____

SCHOOL _____

GRADE _____

BOY _____ GIRL _____

DATE _____

1. In the last year, how often have you visited the Downers Grove Public Library?

   _____ More than once a month

   _____ Once a month

   _____ Less than once a month

   _____ Never

2. Have you ever used the PAC terminals (online catalog) to locate materials in the Downers Grove Library?

   _____Yes _____No

3. Have you ever used the card catalog to locate materials in the Downers Grove Public Library?

   _____Yes _____No

4. Which catalog do you prefer to use?

   _____ PAC terminal (online catalog)

   _____ Card Catalog

   _____ No preference

Why? _____

_____

1. Write the letter that comes before each of these letters in the alphabet.
   Example: _____ z

_____c _____m

_____q _____i

_____o _____v

_____j _____e

_____r _____x

2. Write the letter that comes after each of these letters in the alphabet.
   Example: _____ a

f_____ u _____

w _____ k _____

p_____ d _____

h_____ n _____

s _____ l _____

3. Number these words in alphabetical order.

   Example: _____ cat

   _____ dog

   _____ apple

_____ used

_____ wear

_____ vine

_____ tear

_____ quiet

_____ open

_____ pour

_____ robin

4. Number these words in alphabetical order.

_____ dove

_____ dwelling

_____ dear

_____ dyed

_____ dry

_____ during

_____ date

_____ diet

5. Number these words in alphabetical order.

_____ poster

_____ porcupine

_____ power

_____ poultry

_____ possess

_____ porcelain

_____ powder

_____ positive

6. Authors and titles.

Does Little Pear come before or after "Little, Jean" in our card catalog?

_____ before

_____ after

Does The Bell Witch come before or after "Bellairs, John" in our card catalog?

_____ before

_____ after

Does Wildlife on the Watch come before or after "Wilde, Oscar" in our card catalog?

_____ before

_____ after

7. Pretend these are labels on the card catalog. Write down the drawer number where you would look for each author or title.

1. A-B	4. Db-Do	7. Hep-Jan	10. M-Mac
2. C-Ch	5. Dp-Goh	8. Jao-La	11. Mb-Mi
3. Ci-Da	6. Goi-Heo	9. Le-Lz	12. Mj-Mz

1. Moominland Winter ____
2. Is That You Miss Blue? ____
3. He's My Brother ____
4. Candles, Cakes, & Donkey Tails ____
5. Einstein Anderson, Science Sleuth ____
6. McGowen, Tom ____
7. Fradin, Dennis ____
8. Hest, Amy ____
9. Dewey, Ariane ____
10. Hepzibah ____
11. Mr. Popper's Penguins ____
12. Dr. Doolittle ____
13. Goffstein, Brooke ____
14. Gravity is a Mystery ____

8. Number these titles in alphabetical order as they appear in our card catalog.

_____ Saints for all Seasons

_____ St. Patrick's Day

_____ The Saints

_____ Saint Jerome

9. Number these titles in alphabetical order as they appear in our card catalog.

_____ Ah-Choo

_____ The ABC's

_____ A Horse Called September

_____ A is for Angry

_____ The Horse and His Boy

10. Number these titles in alphabetical order as they appear in our card catalog.

_____ Is There Life on a Plastic Planet?

_____ Dr. Doom: Superstar

_____ Deathwatch

_____ Look-it-up Book of Stars and Planets

_____ Look! Look!

11. Number these titles in alphabetical order as they appear in our card catalog.

_____ Monster is Coming

_____ Monster in the Third Dresser Drawer

_____ Monster Manners

_____ Monster Mania

_____ Monsters, Mysteries, and UFOs

_____ Monster Trucks and Other Giant Machines on Wheels

_____ Monster Birthday Party

_____ Monster & the Tailor

_____ Monsters from the Movies

_____ Mountains Around the World

_____ Monster's Nose Was Cold

12. Alphabetizing authors.

Does "Fleischman, P.R." come before or after "Fleischman, Charles" in our card catalog? _____ before

_____ after

Does "Flesch, Y." come before or after "Fleischman, Charles" in our card catalog? _____ before

_____ after

Does "Fletcher, Jessica" come before or after "Fletcher, A. Sarah" in our card catalog? _____ before

_____ after

13. Number these names in alphabetical order as they appear in our card catalog.

_____ Foster, Stephanie

_____ Fortune, J. J.

_____ Ford, Ford Madox

_____ Foster, Sally

14. Number these subjects in alphabetical order as they appear in our card catalog.

_____ Carpentry

_____ Carnivals

_____ Castles

_____ Cartoons

15. Number these authors and titles in alphabetical order as they appear in our card catalog.

_____ Frankenstein

_____ Frankel, Max

_____ Frank and Mary

_____ Fradin, Dennis

16. Number these authors and titles in alphabetical order as they appear in our card catalog.

_____ Amos Fortune, Freeman

_____ Freeman, Don

_____ Free to be You and Me

_____ Fortune, Amos

17. Number these subjects in alphabetical order as they appear in our card catalog.

_____ Foods—Manufacturing

_____ Friends, Society of

_____ Food—Social Customs

_____ Friendship—Ethics

GRADING PROCEDURE

All questions which require numbering items in alphabetical order will be checked for proper sequence; adjust key to reflect wrong answers so that all answers following one wrong answer are not automatically counted wrong if they are in the correct sequence.

1)	10 points possible	1 point for each answer
2)	10 points possible	1 point for each answer
3)	8 points possible	1 point for each answer
4)	8 points possible	1 point for each answer
5)	8 points possible	1 point for each answer
6)	6 points possible	2 points for each answer
7)	14 points possible	1 point for each answer
8)	4 points possible	1 point for each answer
9)	5 points possible	1 point for each answer
10)	5 points possible	1 point for each answer
11)	11 points possible	1 point for each answer
12)	6 points possible	2 points for each answer
13)	4 points possible	1 point for each answer
14)	4 points possible	1 point for each answer
15)	4 points possible	1 point for each answer
16)	4 points possible	1 point for each answer
17)	4 points possible	1 point for each answer

115 total points possible

APPENDIX C

Sample Screens

Sample Entries

List of Searches

Observation Sheets

ILLUSTRATIVE TITLE SEARCH ON CLSI'S PAC TERMINAL

Suburban Library System Installation, Burr Ridge, Illinois

Note: Because new titles are added to the database regularly, the alphabetical breakdowns in the lists change constantly. These lists appeared on DGPL's PAC terminals in March, 1988 and are provided here as an illustration of an online search for the title The Curse of the Blue Figurine. The correct entry that was touched on each screen is noted in parentheses.

Introductory Screen for the Online Catalog

THIS IS YOUR COMPUTER CATALOG

At the touch of a finger, you can find information about materials in the library.
Subject information is available for materials added to the library since January 1983.
To begin your search, touch AUTHOR, SUBJECT OR TITLE shown below.

NOTE: Entries beginning with punctuation, symbols, or numbers are filed before the alphabet.

AUTHOR

➤ TITLE *(CORRECT ENTRY TO TOUCH)*

SUBJECT

START OVER

HELP

Second Screen on PAC Terminal

"...And The Earth Did Not Part." (CORRECT ENTRY TO TOUCH)
Double Deception
Kuleshov On Film: Writings/
Retirement In Spain: A Guide To Good Living For Senior

START OVER

HELP

Third Screen of Title Search

"...And The Earth Did Not Part."
Aircraft Identification Illustrations
Animal Adventure Series
Automobile Body Reconditioning/
Best of Saki (H.H. Munro) /
Books for Early Childhood: A Developmental Perspective
Caravan From Timbuktu
Chinese-Kosher Cookbook
Company That Cares: One Hundred Year Illustrated History of Joh
➤ Country Mouse and City Mouse *(CORRECT ENTRY TO TOUCH)*
Decline And Fall Of America

START OVER

HELP

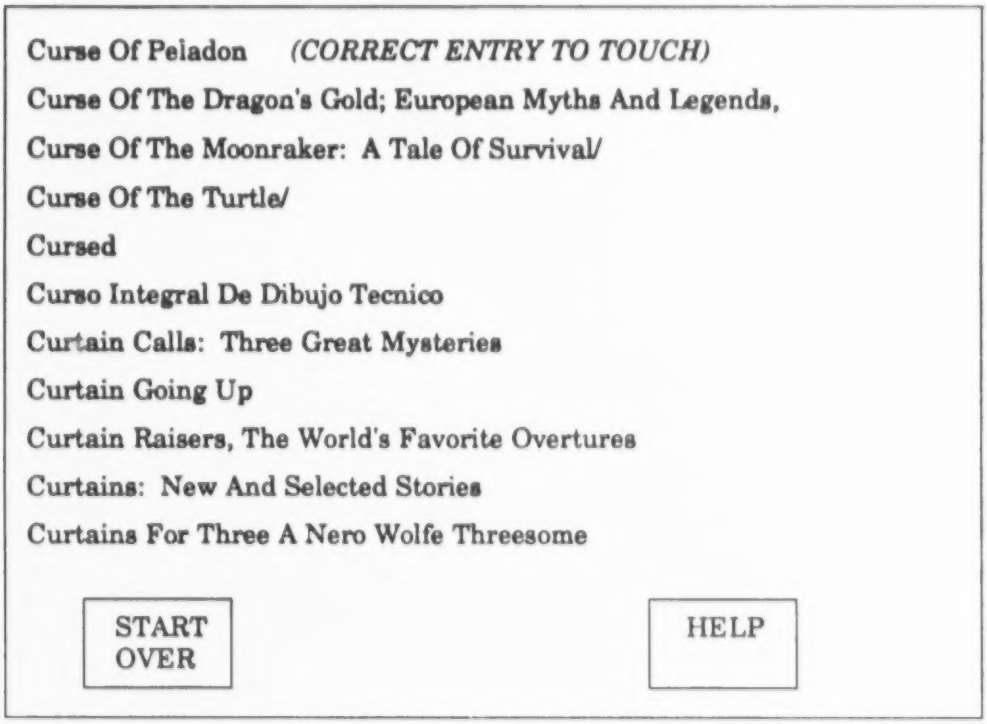
Fourth Screen of Title Search

Country Mouse And City Mouse
Craft Of Writing Articles: A Practical Guide
Creative Work With Textiles
Critical Introduction To Ethics
Cryes of Londontown,
➤ Current Studies In Social Psyc *(CORRECT ENTRY TO TOUCH)*
Daisy And The Dog Show
Danny Dunn & The Homework Computer
Daughter Of The Moon/
Days Without Time; Adventures Of A Naturalist
Death Comes As The End/

START OVER

HELP

Sixth Screen of Title Search


Curse Of Peladon (CORRECT ENTRY TO TOUCH)
Curse Of The Dragon's Gold; European Myths And Legends,
Curse Of The Moonraker: A Tale Of Survival/
Curse Of The Turtle/
Cursed
Curso Integral De Dibujo Tecnico
Curtain Calls: Three Great Mysteries
Curtain Going Up
Curtain Raisers, The World's Favorite Overtures
Curtains: New And Selected Stories
Curtains For Three A Nero Wolfe Threesome
START OVER
HELP

Seventh Screen of Title Search

FROM: CURSE OF PELADON
Curse Of Rathlaw
Curse Of Sagamore
Curse Of Still Valley
➤ Curse Of The Blue Figurine *(CORRECT ENTRY TO TOUCH)*
Curse Of The Bronze Lamp
Curse Of The Clan
Curse Of The Cobra/
Curse Of The Concullens
Curse Of The Crooked Cow
TO: Curse Of The Demon

START OVER	---BROWSE REVERSE--- FAST SLOW	---BROWSE FORWARD--- SLOW FAST	HELP

Eighth Screen of Title Search

* THERE IS 1 ENTRY. TOUCH IT TO SEE FULL RECORD. *

The curse of the blue figurine
Bellairs, John

* THERE ARE NO MORE ENTRIES FOR THIS SELECTION. *

START OVER	BACK UP	HELP

Ninth Screen of Title Search

TITLE: The Curse of the Blue Figurine
4TITLE: Dial books for young readers
AUTHOR: Bellairs, John
PUB. INFO: New York, N.Y.: Dial Press, c1983
CLASS NO: [Fic]
PHYS. DESCR: 200p.
2NOTES: Johnny Dixon is plunged into a terrifying mystery-adventure when he removes a blue figurine called a shawabti from church.
1SUBJECT: Mystery and detective stories

PUB	PUBYR	COST	MC	ED	L.A.D.
	1983	$12.00			3/23/88

COPIES AT THIS LOCATION

LOCATION	BAR CODE	L.A.D.	STATUS
DGS	3 1191 00164 2495	3/23/88	ON SHELF

CALL NO: J/BELLAIRS

START OVER | ADD'L COPIES | BACK UP | HELP

Text of CLSI "Help" Screen

Detailed information for the brief record you selected is displayed on the screen.

If a copy is "ON SHELF" in this branch, write down the call number and locate it on the shelf. If a copy is not available at this branch, ask the librarian for assistance.

You may touch one of the following functions:

START OVER - Touch to go back to the beginning.

PAGE NEXT - Touch to display any more information on this record.

PAGE BACK - Touch to display any previous information on this record.

BACKUP - Touch to go back a step in your search.

HELP - Touch to receive additional instructions during your search.

Now touch "RETURN" to go back to where you were.

START OVER

RETURN

Sample Entry — Card Catalog

```
J                Dewey, Jennifer.
636.6                   Clem:  the story of a raven/
DEW              written and illustrated by Jennifer
                 Owings Dewey. -- New York:  Dodd, Mead,
                 c1986.
                        127 p.: ill.; 22 cm.
                        Summary:  The author describes
                 her family's experiences raising and
                 caring for a raven from babyhood to
                 adulthood when he returns to the wild.
                        ISBN 0-396-08728-0

                        1. Ravens .   I. Title

IDOW
                                        JCXPat      85-27440
```

Sample Entry — Online Catalog

```
TITLE:  Clem:  the story of a raven
AUTHOR:  Dewey, Jennifer
PUB. INFO:  New York : Dodd, Mead, c1986.
CLASS NO:  636
PHYS. DESCR:  127p :  ill.; 22 cm.
2 NOTES:  The author describes her family's experiences
raising and caring for a raven from babyhood to adulthood
when he returns to the wild.
1SUBJECT:  Ravens - Juvenile literature
2SUBJECT:  Ravens

        PUB     PUBYR      COST     MC     ED     L.A.D.
                1986       $12.00                 10/6/86

              * COPIES AT THIS LOCATION *

LOCATION BAR CODE                          L.A.D.     STATUS

DGS      3  1191  000243  5055             10/11/86
Due 11/1/86
CALL NO: J/636.6/DEW
```

SEARCH ITEMS

TITLE

Who Will Be My Friend

The Poison Factory

Octopus Pie

The Best Bad Thing

The Curse of the Blue Figurine

AUTHOR

Fairman, Paul W.

Harder, Eleanor

Geibel, James

Chaconas, Doris J.

Sykes, Jo

SUBJECT

Animals, Training of

Fire Stations

Seals (Animals)

Payton, Walter, 1954

Insects - Poetry

BABER RESEARCH PROJECT
Card Catalog Observation Record

Name _____

M _____ F _____

Grade ___

Search Card #1 _____ #2 _____ #3 _____

Date___/___/86

I. Identify the elements of the card catalog entry:

AUTHOR	____ Immediate	___ With Difficulty	___ Unable
TITLE	____ Immediate	___ With Difficulty	___ Unable
CALL NUMBER	____ Immediate	___ With Difficulty	___ Unable

II. Search Card #1 _____

1) DIFFERENTIATES AUTHOR-TITLE & SUBJECT

_____ Immediate

_____ Begins on wrong side; corrects

_____ Unable

2) CHOOSES CORRECT DRAWER

_____ Immediate

_____ Near miss on locating correct

_____ Number of incorrect attempts

_____ Random attempts to locate drawer.

_____ Unable to locate

3) CHOOSES CORRECT CARD

_____ Locates correct card

_____ Uses guide, efficient search

_____ Appears to use guides occasionally

_____ Card by card

_____ Flips randomly through drawer

_____ Unable

4) CALL NUMBER GIVEN _____
Comments:

BABER RESEARCH PROJECT

Card Catalog Observation Record

Name _____

M _____ F _____

Grade ___

Search Card #1 _____ #2 _____ #3 _____

Date___/___/86

I. Identify the elements of the card catalog entry:

AUTHOR	____ Immediate	___ With Difficulty	___ Unable
TITLE	____ Immediate	___ With Difficulty	___ Unable
CALL NUMBER	____ Immediate	___ With Difficulty	___ Unable
CALL NUMBER FOR D.G.P.L. COPY		___ Immediate	
		___ With Difficulty	
		___ Unable	

IS THIS A DOOK D.G.P.L. OWNS? HOW DO YOU KNOW?

_____ Immediate

_____ With Difficulty

_____ Unable

II. Search Card #1 _____

1) DIFFERENTIATES AUTHOR-TITLE-SUBJECT _____ yes

_____ no

_____ correct 2nd time

_____ unable

2) LOCATES CORRECT ENTRY _____ yes

_____ no

3) CALL # GIVEN _____

UNABLE TO LOCATE CALL # _____

GIVES CLASS # _____

4) NUMBER OF TOUCHES ___

5) NUMBER OF TIMES STARTS SEARCH OVER AT BEGINNING ____

6) TIME OF COMPLETE SEARCH _____

SEARCH INCOMPLETE _____

Comments: